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SCIENCE AND TECHNOLOGY

(FOUO 5/82)

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FRANCE'S NEW RESEARCH, DEVELOPMENT STRATEGY ANALYZED

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[Article by Marc Albouy and Pierre-Frederic Teniere-Buchot[1]: "Research and Technology--Prospects Until 1985"]

[Excerpts] While France managed to join the front rank of international research between 1958 and 1967, we have since then been witnessing the abrupt disengagement of the government as expressed by a research and development effort not exceeding 1.8 percent of the gross domestic product. The new administration intends to respond to this long period of underinvestment by setting itself the target of devoting 2.5 percent of the gross domestic output in 1985 to research and development expenditures. This sudden change, which was designed in 1980 to launch the Eighth Plan and the term of office of minister Pierre Aigrain, is now being pursued with determination by the new administration which, the moment the 1982-1983 Interim Plan had been drafted, during autumn held a series of regional meetings whose contribution was to be debated during the National Research Conference (14-15 January 1982) in order finally to lead to a Guidance and Programming Law. Marc Albouy and Pierre-Frederic Teniere-Buchot, the joint reporters of the Interministerial Group for the Interim Plan[2], here present the objectives and methods around which France's new research and development strategy is taking shape.

Development Method and Contents of the 1982-1983 Interim Plan

In accordance with prior guidelines, the 1982-1983 Interim Plan has two complementary objectives in the matter of research and development:

To define an overall medium-term strategy so as to attain the administration's objective under the best possible conditions;

Based on that strategy, to propose a coherent program of horizontal short-term restoration measures and to sketch the thematic priorities which will be used for guidance in the study and implementation of coordinated research and development actions.

The Interministerial Group charged with drafting the list of proposals presented to the Central Planning Commission[3] thus first of all decided to define a financial

scenario leading up to 1985. In doing this, it fell back on the original experience during the work of the Eighth Plan when several scenarios were studied (two long-term hypotheses, that is, 1985 and 1990, to attain a DNRD/PIB [national research and development expenditure/gross domestic product] ratio of 2.3 percent in conjunction with two assumptions regarding the increase in the financial effort made by the enterprises)[6].

Progress was made in two directions concerning the Interim Plan.

(1) The possibilities and the needs of the various sectors were spelled out more specifically. On that score we can mention the financing effort of the enterprises: although it looks relatively high (8 percent of the average annual volume increase between 1982 and 1985), it is more in line with an assumption as to a progressive "power" increase which presupposes energetic action by public enterprises (both old and new) and a group of measures providing incentives for industrial research. The same is true of the requirements of university research and telecommunications.

We might also mention the share of the military budget allocated to research and development which represents more than 20 percent of the DNRD: the figures given for the financial scenario are compatible with the military planning law.

Collaboration with the Defense Ministry in this respect was exemplary and is a harbinger of developments to come: the economic fallout from activities connected with defense as a matter of fact are so important on the level of the region that it is no longer possible for the Plan to ignore them.

Generally speaking, the Interim Plan tried to insert into the financial scenario the possibilities and needs of the main actors: the distribution of the effort thus springs from a consensus where each of the actors agreed to play his part in the national restoration effort.

(2) Considering both the financing sources and the places of execution, the Plan achieved decisive progress in the drafting and coherence of medium-term strategy. It first of all cast light upon the need for combining the financial target (DNRD equal to 2.5 percent of the PIB) with an execution target, that is to say, to make sure that the research and development work done by the enterprises (both public and private) will come to 1.5 percent of the PIB in 1985, that is to say, 60 percent of the DNRD. This proposal received the unanimous support of the Central Planning Commission and also got massive support from the Economic and Social Council.

It then cast light upon the extent of financial transfers necessary to attain this second objective: the orders and the incentives from the government to the enterprises, in the matter of research and development, will have to increase from Fr8 billion at 1980 prices to more than Fr18 billion at 1980 prices for the period of 1980-1985. For civilian transfers alone, they will have to increase from 1.9 to almost Fr9 billion at 1980 prices. Here we have the real challenge on which depends the future of French technology and industrial research. This transfer requires the rapid implementation of new technological programs because the line of credit concerning them should rise from Fr6 to Fr15 billion at 1980 prices in 5 years. It would also be desirable for a portion of this transfer (about Fr2 billion) to be intended for the promotion of industrial research, to revive innovation, and to reorganize team research.

Research and Technology--Prospects for 1985

Interministerial Research Package (billions of 1980 francs)	Year 1981, Payment credits plus regular expenditures	Measures proposed for the 2-year plan, 1982-1983
Personnel	6.7	+6.5% per year
Operational funds	2.25	+50% over 2 years
Infrastructure and current related expenditures	1.1	+20% per year (roughly)
Major plant and equipment	0.75	+16% per year
Incentive credits	0.5	+100% over 2 years
Interministerial research package	11.3(1)	+13.6% per year

(1) This figure corresponds to 11.5 billion 1980 francs in program authorization; Source: Report entitled "Le redressement de la Recherche et de la Technologie" [The Restoration of Research and Technology], Interministerial Administrative Group of the Interim Plan, Paris, La Documentation Francaise, 1981.

This financial scenario thus enables us to accentuate the central point of this medium-range strategy and, continuing from there, to draft the main lines of action.

The coherence of the entire scenario clearly showed the terms of the political decision itself: either the government allows the enterprises to proceed at their pace and in that case it would be forced massively to intervene on its own budget to compensate for lack of industrial interest; it will even be forced, on that assumption, to create its own technological development agencies. Or the government pursues a twin policy of incentives (through contracts with national enterprises, through a set of bonuses and assistance for private enterprises). which will enable it to relieve the pressure on its own budget and to "let things take their course" instead of intervening directly.

The second alternative was selected: it is now well charted. The coherence of the scenario proposed is sufficiently well founded so that any major lag in its implementation would seriously harm compliance with the objective established by the administration. We must no longer waste time or energy in wondering about the road to be followed in an effort to perfect it (which indeed is a French failing); instead we must resolutely work toward the attainment of the objectives within the required time frame.

Starting with the 1985 financial focus, the group defined a 1983 scenario in terms of financing and execution. But the critical point in 1983 is not only the interpolation of the 1985 projection. The Interim Plan as a matter of fact cannot be just a simple reference point on a path to be followed because this means rapidly correcting the imbalances and at the same time placing research and technology into an orbit leading to the target. This twin operation will cost much in terms of studies, reorganization, mobilization of competence, miscellaneous achievements, and therefore funds. The 1983 scenario includes the cost for restoration and the cost for placing the effort in orbit; it will require a larger immediate effort.

The financial scenario for 1985 has made it possible to detect the main lines of action which will develop from the previously mentioned central problem:

While it is necessary rapidly to restore public research funds (operational funds and infrastructure expenditures), this will have to be done harmoniously so that we will be able fully to use a major infusion of funds during the next several years. The research laboratories must be assured that we will not make the same old mistakes over again.

It is with this intention that a certain number of measures were included in the plan concerning the improvement of management--especially the drafting of good management ratios--the implementation of an overall and decentralized funding policy for research personnel, the practice of funding estimates and management procedures in terms of complete costs, and a more precise estimate of the payment fund requirements. The increase in the hiring volume, established at 4.5 percent per year but modulated according to personnel categories and laboratories, should permit the necessary renewal of teams and, after the restoration of the proper level, should guarantee a rise in basic and applied research. The speedup of the installation of major scientific equipment and the addition of a certain number of projects will run in the same direction.

The attainment of the objective involves the promotion of industrial research and technical innovation.

There are three types of action which will be pursued or which have been launched toward this end:

Using the tool of national enterprises and perfecting the tool of major technological programs;

Promoting research and innovation within the enterprises; the principle of aid for scientific personnel hiring--following the example of the FRG--was accepted by all of the social partners and the methods involved should be studied rapidly. Old measures (aid for innovation, medium-term innovation) will be perfected. The banks and the industrial enterprises will be encouraged to create new financing companies for innovation and risk capital companies. Finally, it is planned to double the final aid package[7] for industry;

Increase the possibilities of "outside" research through the resumption and expansion of the innovation bonus, the encouragement of association research, the revival and reorganization of group research and technical assistance.

Preparations for the future involve the following:

Training (adaptation of the training of young people for and by research, insertion of research activities into the various forms of teaching, supplementary training of industrial supervisory personnel);

Organization of research potential of higher educational institutions (especially the big schools) capable of serving as lines leading toward industrial research;

Cooperation between public and private research laboratories;

Transfer of knowledge with high-technology countries.

A certain number of these measures was provided for this purpose.

The involvement of the regions in national research and technology policy will be carried out through the strengthening and better organization of the regions' potential and through a broader initiative on their part in certain areas (programs of regional interest, creation of common facilities and collective resources, upgrading efforts, efforts involved in scientific and technical information, as well as technological assistance).

Each ministerial department has contributed its thinking on each of the four major axes of this action program; the proposals have been debated. Only those proposals which appeared most effective in defining the action program were selected for the plan draft and this was done only after an opinion had been obtained from the Central Commission of Partners.

Each ministerial department also was invited to express its research and technological development requirements corresponding to its medium-term concerns: the Ministry of Culture for example mentioned the restoration of balance necessary with regard to living creativity; the Ministry of Maritime Affairs raised the problem of a new oceanographic vessel and the problem of funds devoted to research on living matter (fish, marine crop cultivation, study of the marine environment). Projects which had been blocked until now have come up again, such as the human sciences research library. Others have entered a new stage, such as the cryogenic trans-sonic wind tunnel. These contributions have made it possible to outline some thematic priorities which, added on top of the study missions already launched, will constitute "the guiding thread" of a new research and technology policy.

In this respect, the Plan has selected:

Three sectors to be restored: culture, health, and human, economic, and social sciences, particularly emphasizing the latter;

The in-depth development of technological programs in progress;

The need for carrying out as rapidly as possible the six study missions already adopted in the form of action programs[8];

Finally, to launch new missions in four fields: agriculture and food production, materials, mechanics, and precision chemistry.

Interim Plan--Regional Meetings--National Conference--Guidance and Programming Law

This effort--which some people will find to be rather technocratic--may be rather surprising at a time when quite justifiably we are very much concerned with giving all those involved in research a more active role. Before judging it however we must be aware of the constraints involved here. First of all, the Interim Plan had to fit into an extremely tight administration schedule which persuaded the Interministerial Group to work during vacations, a time which is not at all propitious

for broad coordination. In this case, would it have been necessary to forget about research in the Interim Plan whereas a year later, the Eighth Plan had as a matter of fact assigned it top priority? Is it perhaps necessary to wait several additional months in order to get the National Assembly to vote on the necessary recovery actions while the time interval separating us from the target keeps shrinking day after day?

Behind this question we come to the problem of the connection between the "technocratic approach of the Interim Plan" and the results of the "democratic" debate in the regional meetings and the National Conference.

There are three elements of reflection which enable us to place the roles and responsibilities in proper context.

(1) First of all, the thinking of the Administrative Group carefully avoided certain subjects on which it was advisable to have the scientific community express itself. This is true for example of the status of personnel, the participation of researchers in program orientation, and the management of the laboratories, mobility and the organization of scientific and technical information. The same goes for training for research and the revision of the scholarship and allowance system. Fully aware that the actors concerned have much to say on these subjects and that much was to be done, the Group simply "opened the channels" and stressed the need for an overall handling of the research personnel funding effort in a decentralized fashion plus adaptation of the training program.

Regarding other questions, such as team research, the Group only spelled out the principles of reorganization without specifically indicating the method. The Plan as a matter of fact should express itself on this issue which concerns the various branches of industry. But the proposals of the National Conference will probably enable us to work out the methods for this reorganization.

On the other hand, it is evident that the basic researcher, involved in his own work, does not have all the necessary information (especially figures) to draft the overall medium-term strategy and to discern the broad outlines of action necessary to restore the entire research establishment. The proposals of the Interministerial Group and those from research personnel (through the regional meetings and the National Conference) thus appear to us to be largely complementary.

The Interministerial Group for its part tried to pick only those proposals which it considered capable of getting the broader agreement of the scientific community; this is why it confined itself sometimes to just "opening the channels." In this respect, the research missions of the various ministries have sufficient information coming from research circles to prevent serious dissonances. And the first result confirmed the prediction: there is no contradiction between the proposals coming from the regional meetings and the Interim Plan draft.

(2) The shortage of funds, certain hasty measures taken at the end of the preceding 7-year term, caused a certain disaffection in research circles, followed by a growing malaise, and finally a large measure of irritation. It is clear that the restoration of research cannot be accomplished only with money; it must involve the mobilization of all actors in research, especially the researchers themselves.

Research Financing Up to 1985

Financement de la recherche. Horizon 1985

	(3) Années de Référence		(4) Plan de deux ans		(6)	(5) Horizon 1985	(6)
(2) Milliards F 1980	1980	(1) 1981	1982	1983	Accroissement moyen annuel 1983/1981	1985	Accroissement moyen annuel 1985/1981
DNRD	50,5	54,7	58,6	65,2	9,1 %	79,7	+ 9,8 %
(7) Financement industriel	21,7	22,2	23,5	25,3	6,8 %	29,6	+ 7,3 %
(8) Financement par les administrations	28,8	32,5	35,1	39,9	10,8 %	50,1	+ 11,4 %
CP + DO							
(9) Financement budgétaire dont :	31,7	36,4	39,4	44,8	10,9 %	55,6	+ 11,2 %
(10) Financement militaire	11,3	13,3	13,9	14,2	3,3 %		
(11) Financement des enseignants-chercheurs	3,2	4,2	4,5	4,9	8 %		
P.T.T.	1,1	1,7	2,1	2,3	16,3 %		
(12) Autres financements civils	0,2	0,3	0,3	0,4	15,5 %		
(13) Budget coordonné par le Ministère de la R. et T. (EIR + PDT et IRI)	15,9	16,9	18,6	23	16,7 %		
AP + DO							
(9) Financement budgétaire dont :	34,3	39,4	42,9	48,5	10,9 %	60,4	+ 11,3 %
(10) Financement militaire	13,1	15,4	15,5	16,3	2,9 %	17,3	+ 3 %
(11) Financement des enseignants-chercheurs	3,2	4,2	4,5	4,9	8 %	5,4	+ 6,5 %
P.T.T.	1,4	2,1	2,5	2,7	13,4 %	3,5	+ 13,5 %
(12) Autres financements civils	0,2	0,3	0,3	0,4	15,5 %	0,6	+ 18,9 %
(13) Budget coordonné par le Ministère de la R. et T. (EIR + PDT et IRI)	16,4	17,4	20,1	24,2	17,9 %	33,6	+ 17,8 %

(1) Estimation après changement de base.
Source : Rapport « *Le redressement de la recherche et de la technologie* ». Groupe administratif interministériel du Plan intérimaire. Paris, La Documentation Française, 1981.

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Key: 2--billions of 1980 francs; 3--reference years; 4--2-year plan; 5--1985 horizon; 6--average annual increase; 7--industrial financing; 8--financing through adminstrations; 9--budget financing including; 10--military financing; 11--financing of teachers-researchers; 12--miscellaneous civilian financing; 13--budget coordinated by Research and Technology Ministry; (1) estimate after base change; Source: Report "Le redressement de la recherche et de la technologie," Interministerial Administrative Group of the Interim Plan, Paris, La Documentation Francaise, 1981; PTT--Ministry of Posts and Telegraph; /other abbreviations unknown/.

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The regional meetings, first of all, and the National Conference then constitute instruments of dialogue and of collective mobilization. The researchers must reaffirm their existence and their social usefulness; they also have a need for expressing themselves, for organizing themselves in order to get the most out of the funding allocated to them. The researchers in the public laboratories, the members of the academic community, the industrialists who are operating on a limited partnership basis finally must get to know each other better, they must talk to each other, and they must become aware--through the economic problems of their region--of the stakes and constraints of the nation.

The Plan however also provides a building block which is essential to the entire edifice: the massive approval of all of the social partners--both in the Central Commission and in the Economic and Social Council--as a matter of fact constitute indispensable backup support.

(3) In a guidance and programming law, retain those proposals which will emerge from a National Conference on Research that can usefully complete and prolong the planning setup.

The specific areas in which it seems necessary to provide complementation have already been mentioned: adaptation of training for and by research, status of researchers and job opportunities, organization of laboratories, interdisciplinary cooperation.

In addition to these fields, there are three important issues which deserve some response: scientific and technical information, the technological evaluation office, the old technology network; as a matter of fact, due to the lack of well-prepared supporting information folders, the Interim Plan has not been able to dwell on these three basic issues in a firm manner.

On the other hand, certain supplementary steps suggested here either entail the risk of harming instead of aiding research recovery the moment they threaten the overall strategy or they involve measures which have already been debated and, in other words, which have been settled. This is true, for example, regarding taxation in support of industrial research. The proposal is well known and so is its motivation. France does not have any general measure providing an incentive for "in-house" industrial research[9] and this is why two types of measures, following the example of foreign countries, may be advanced: either a tax deduction based on the increase in research and development expenditures or a bonus for research personnel hiring. The Ministry of the Budget and all of the representatives of the labor unions are firmly opposed to the first measure because they consider it inopportune, unfair in terms of taxation, and uncontrollable. The Barre administration already had rejected it, feeling that aid to investment was sufficient. How could one imagine that such a measure has become politically supportable? Especially since all of the social partners--in the Central Planning Commission--accepted the principles of hiring bonuses! Once again advancing the proposal of tax deductions may mislead the people involved and may entail the risk of delaying the implementation of a hiring bonus.

More generally speaking, the Economic and Social Council has expressed the role which it wants to give to the Interim Plan. As a matter of fact it recommended to the

administration to "make sure that the actions provided for under the Interim Plan, the programs under the guidance law voted in 1982, and the programs in the future 5-year plan will not involve any duplication of effort[10] that might lead to the postponement of the achievements provided for in the Interim Plan and thus to the weakening of its scope." To the extent that the guidance law will effectively be based on the medium-range strategy and the action program spelled out in the Interim Plan so as to complete them, it will give the latter a guarantee of continuity. Hence, the entire setup becomes a little bit complex: the 1982-1983 Interim Plan, the 1982-1986 Guidance Law, the 1983-1987 five-year plan--these find their justification in the lasting character which the effort will provide for the restoration of research and technology.

Beyond plans, strategies, and programs, the future is built through daily action. The implementation of the strategy announced will demand great tenacity, an exceptional effort in terms of organization and probably difficult decisions and challenges. After the big research festivities, which undoubtedly will take place during the January conference, the mobilization of all of the various areas of competence must not be relaxed. Will we manage to trigger or accept the indispensable cooperative efforts regardless of where they come from? The challenge is too great and too risky for the future of research and technology in France and we therefore cannot fail to seize every possible opportunity in the course of this effort.

FOOTNOTES

1. Marc Albouy is a lecturer at the Ecole Polytechnique and head of the study and research division, General Planning Commissariat. In this capacity, he edited the "research" chapters of the draft for the Eighth Plan and the 1982-1983 Interim Plan. Pierre-Frederic Teniere-Buchot is associate professor at the National Conservatory of Arts and Crafts.

2. This article only expresses the opinions of its authors.

5. This commission includes the representatives of the labor unions and the associations as well as government experts.

6. This work was done by the group of experts charged with building the priority action program.

7. Coordinated actions, research fund program contracts, incentive funding from ministries and agencies toward the attainment of the objectives.

8. These missions are as follows: biotechnology; jobs and labor; electronics; developing countries; robots and machine-tools; efficient use of energy and geothermia.

9. The innovation bonus is an automatic measure providing incentives for "outside" research, reserved for the PME [small and medium-size businesses].

10. And, of course, incoherences (authors' note).

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